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09/731,385	12/06/2000	Myeong-cheol Kim	SAM-164	8322

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EXAMINER
NADAV, ORI

ART UNIT	PAPER NUMBER
2811	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/731,385	Applicant(s) KIM ET AL.	
	Examiner ori nadav	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *16-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 December 1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restriction

1. Applicant's election without traverse of Group I, claims 1-15 in Paper No. 6 is acknowledged.

Oath/Declaration

2. The oath/declaration filed on 12/6/2000 is acceptable.

Drawings

3. The formal drawings filed on 12/6/2000 are acceptable.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the field oxide layer and the conductive pad layer, as recited in claims 12 and 13, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Priority

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

6. The Information Disclosure Statement filed on 1/16/2001 has been considered.

Claim Objections

7. Claim 1 is objected to because of the following informalities: Claim 1 recites the limitation "the second insulation layers" in line 12. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 12 and 13 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support for a device comprising a second conductive layer filling a contact hole, as recited in claim 1, wherein a field oxide layer formed on a certain portion of the surface of the underlying layer, wherein the second conductive layer is formed to at least partially

contact the field oxide layer, and a conductive pad layer formed on a certain portion of the surface of the underlying layer, wherein the second conductive layer is formed to contact the surface of the conductive pad layer, as recited in claims 12 and 13, respectively, in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-15 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. The claimed limitation of a second insulation layer formed on the sides of each conductive layer pattern exposed above the first insulation layer, as recited in claim 1, is unclear as to which element the term "exposed" refers.

13. The claimed limitation of "which passes through the first insulation layer.", as recited in claim 1, is unclear as to which element passes through the first insulation layer.

Correction is required.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> > (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> > (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

15. Claims 1 and 3-7, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 102(e) as being anticipated by Huang (5,899,722).

Huang teaches in figure 1b and related text a semiconductor device having a self-aligned contact (column 2 line 65), the semiconductor device comprising: a plurality of conductive patterns formed to be adjacent to one an other by sequentially stacking and patterning a first conductive layer 30 and a mask layer 31 on a particular underlying layer 39; a first insulation layer 34 filling a gap between adjacent conductive layer patterns such that the upper portion of each conductive layer pattern is exposed; a second insulation layer 33 having a spacer shape, the second insulation layer formed on the sides of each conductive layer pattern exposed above the first insulation layer; and a second conductive layer 37 filling a contact hole which is self-aligned with respect to the second insulation layers between adjacent conductive layer patterns and which passes through the first insulation layer.

Regarding claim 3, Huang teaches in figure 1b the top of the first insulation layer 34 is higher than the top of the first conductive layer of each conductive layer pattern 30.

Regarding claims 4-7, Huang teaches in figure 1b an etching rate of the first insulation layer is larger than that of the second insulation layer, the dielectric constant of the first insulation layer is smaller than that of the second insulation layer, wherein the first insulation layer is formed of a silicon oxide layer and the second insulation layer is formed of a silicon nitride layer.

16. Claims 1, 3-8, 10 and 15, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al. (5,817,562). Regarding claims 1, 4-7 and 15, Chang et al. teach in figure 7 and related text a semiconductor device having a self-aligned contact, the semiconductor device comprising: a plurality of conductive patterns formed to be adjacent to one an other by sequentially stacking and patterning a first conductive layer 16 and a mask layer 18 on a particular underlying layer 10; a first insulation layer 24 filling a gap between adjacent conductive layer patterns such that the upper portion of each conductive layer pattern is exposed; a second insulation layer 26 having a spacer shape, the second insulation layer formed on the sides of each conductive layer pattern exposed above the first

insulation layer; and a second conductive layer 34 filling a contact hole which is self-aligned with respect to the second insulation layers between adjacent conductive layer patterns and which passes through the first insulation layer.

Regarding claim 4-7, Chang et al. teach in figure 7 an etching rate of the first insulation layer is larger than that of the second insulation layer, the dielectric constant of the first insulation layer is smaller than that of the second insulation layer, wherein the first insulation layer is formed of a silicon oxide layer and the second insulation layer is formed of a silicon nitride layer.

Regarding claim 15, Chang et al. teach in figure 7 the first conductive layer of each conductive layer pattern is a gate electrode, and the contact contacts the surface of a semiconductor substrate.

Regarding claims 3 and 8 and 10, Chang et al. teach in figure 7 and related text a semiconductor device having a self-aligned contact, the semiconductor device comprising: a plurality of conductive patterns formed to be adjacent to one an other by sequentially stacking and patterning a first conductive layer 16 and a mask layer 18 on a particular underlying layer 10; a first insulation layer 26 filling a gap between adjacent conductive layer patterns such that the upper portion of each conductive layer pattern

is exposed; a second insulation layer 28 having a spacer shape, the second insulation layer formed on the sides of each conductive layer pattern exposed above the first insulation layer; and a second conductive layer 34 filling a contact hole which is self-aligned with respect to the second insulation layers between adjacent conductive layer patterns and which passes through the first insulation layer., wherein the top of the first insulation layer 26 is higher than the top of the first conductive layer of each conductive layer pattern 16.

Regarding claim 8, Chang et al. teach in figure 7 a third insulation layer 24 provided between the first insulation layer and the sides of each conductive layer pattern and between the second insulation layer and the side of the conductive layer pattern.

Regarding claim 10, Chang et al. teach in figure 7 a fourth insulation layer 24 provided on the surface of the underlying layer except for a portion contacting the second conductive layer and on the surfaces of the conductive layer patterns.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. Claims 2, 9 and 11-13, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al.

Chang et al. teach substantially the entire claimed structure, as applied to claim 1 above, except stating that the third and fourth insulation layer is formed of at a thickness of 50-200 A. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use third and fourth insulation layer at a thickness of 50-200 A in Chang et al.'s device, since it is a matter of design choice within the skills of an artisan, subject to routine experimentation and optimization.

Regarding claim 2, Chang et al. teach in figure 7 a horizontal layer 24 having a top surface. The top surface of horizontal layer 24 is lower than the top of the first conductive layer of each conductive layer pattern 16. Therefore, Chang et al. a first insulation layer being lower than the top of the first conductive layer of each conductive layer pattern.

Regarding claim 12, Chang et al. teach a field oxide layer formed on a certain portion of the surface of the underlying layer (column 5, lines 13-15), wherein the second conductive layer is formed to at least partially contact the field oxide layer.

Regarding claim 13, Chang et al. teach conductive pad layer (column 7, lines 23-26) formed on a certain portion of the surface of the underlying layer, wherein the second conductive layer is formed to contact the surface of the conductive pad layer.

19. Claim 14, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang.

Huang teaches substantially the entire claimed structure, as applied to claim 1 above, except stating the first conductive layer of each conductive layer pattern is a bit line, and the second conductive layer serves to connect a storage electrode of a semiconductor capacitor to a semiconductor substrate.

Huang teaches that the disclosed structures can apply to DRAM. A DRAM comprises a first conductive layer being a bit line, and a second conductive layer serves to connect a storage electrode of a semiconductor capacitor to a semiconductor substrate. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Huang's device in a DRAM device in order to use the device in a specific application which requires a DRAM device.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References C and N are cited as being related to SAC DRAM.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(703) 308-8138**. The Examiner is in the Office generally between the hours of 7 AM to 3 PM (Eastern Standard Time) Monday through Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached at **(703) 308-2772.**

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

Tom Thomas

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Ori Nadav

March 8, 2002